Aircrew Selection and Training

U.S. AIR FORCE

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First Selection Program

- Wilbur won the coin to[illegible] ılled the aircraft)
- Orville (the only other "applicant"), therefore, made the first powered flight, five days later, on 17 Dec 03
  - Restricted range, but excellent, although limited, applicant pool
  - All applicants had the (W)right stuff
    - Designed aircraft, invented control system, made own engine

What is Pilot Selection?

- ***Selection*** **involves matching people to jobs**
  - **Select job applicants whose abilities, interests, and characteristics match organizational needs**
- **Organizational goals:**
  - **Reduce costs associated with recruitment, training, and retention**
    - **Cost of pilot training failures is high**
    - **Avoid loss of aircraft and loss of life**
  - **Enhance mission effectiveness**
    - **Top performers are much more effective than low performers**
- **Applicant goals**
  - **A Euro-NATO Joint Jet Pilot Training (ENJJPT) student pilot with advanced scientific degrees complained that undergraduate pilot training (UPT) was "nice, but it really broke up the day"**

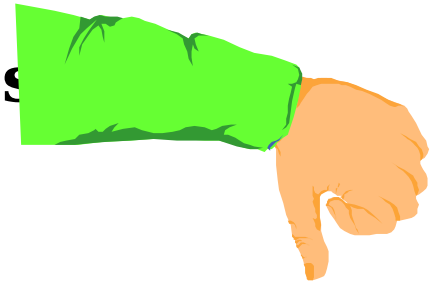
    - Self-Initiated Elimination!

Selection: Why is it Important?

- **Selection implies screening of job applicants and rejecting some**
- **Justifications for selection:**
  - **Number of applicants is greater than the number of training or job positions**
  - **Predictive validity of selection process can be demonstrated**
    - **Training failure cost avoidance**
    - **Other measures of performance (e.g., # of flying hours needed to complete training, fighter qualification, on-the-job performance)**

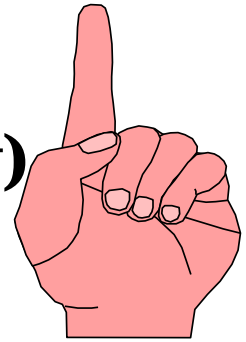
Assessment

Select Out (Fitness



Vs.

Select In (Suitability)



Minnesota Multiphasic Personality Inventory (MMPI)

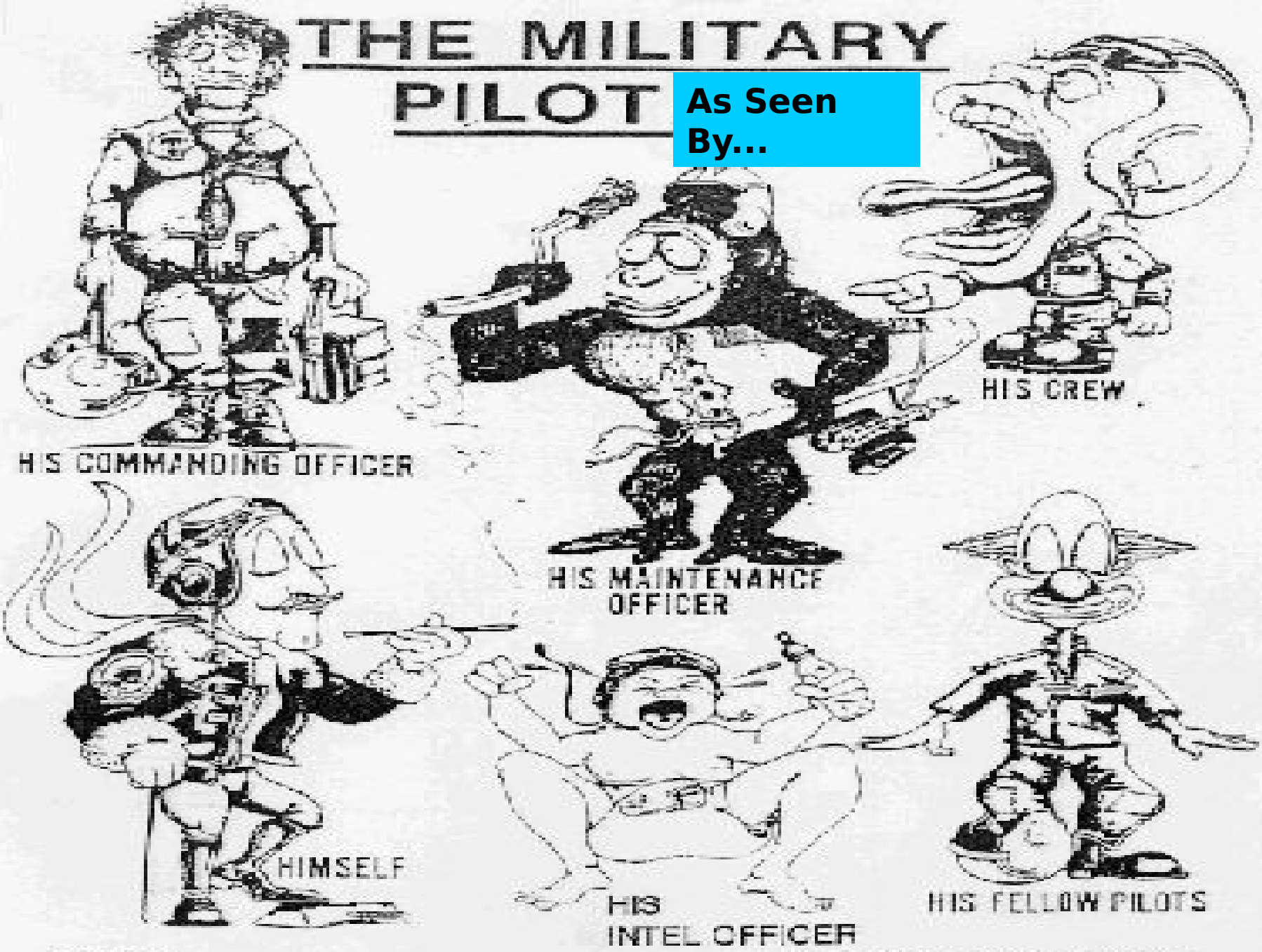
- Normed on the general (as opposed to an aviator, or even military-specific) population
  - Normal pilots, however, differ from the general population
- MMPI (and now the MMPI-2) useful as a select-out test
  - There are profiles that we know are (or should be) disqualifying

Strategic Selection

- **Remember - You end up with what you selected in the first place**
  - **In other words, think about how this person will fit in with your organization over the course of a career**
  - **A good fit considers the culture of the organization, national culture, and the tasks/missions at hand**
    - **The energetic and innovative lieutenant <u>may</u> become the unfocused and disruptive midcareer officer**
  - **Crew Resource Management training can't fix your selection errors!**
  - **Think about your organization as a whole - good to have a healthy mix of individuals**

THE MILITARY PILOT

As Seen By...



Adaptability Rating for Military Aeronautics ARMA

Healthy candidates for military flying training may vary considerably in their ability and in their motivation to fly. A variety of tests are used to predict flying ability, but motivation may be addressed only through such subjective measures as a semi-structured interview.

Mills JG, Jones, DR. The Adaptability Rating for Military Aeronautics: An historical perspective of a continuing problem, *Aviation, Space, and Environmental Medicine*, June 1984, 558-562.

ARMA

- **The USAF's use of the ARMA is limited compared to the US Navy and US Army**
  - **USAF typically just uses the ARMA for entry into training**
  - **US Navy flight surgeons may assess aeronautical adaptation on a recurring basis**
    - **Personality Disorders can result in a rating of NAA**
    - **Personality Disorders an administrative disposition in the USAF and left to the Commander**
- **Not validated**
  - **Don't know how those eliminated on basis of ARMA would have done**
- **Not consistently used by flight surgeons on initial exam**

Can and Will

- **We are better at discriminating between those who CAN and who CANNOT fly (ability) than we are at determining who WILL and who WILL NOT fly (motivation)**
- **"Honeymoon Effect"**

  Short-term research is frequently plagued by the "honeymoon effect;" students, attempting to look their best, can sustain a high level of performance in the short-run (Helmreich, Sawin, and Carsrud, 1986). While many measures can discern who *can* (aptitude) finish pilot training, there is scant information available on who *will* (motivation) finish pilot training and become effective aviators.

Background Questionnaires

- **U.S. Navy exit interviews in 1971 indicated that student pilots withdrew for factors <u>other</u> than lack of ability or mental/physical defects**
  - **Attitudes toward the military**
  - **(Lack of) previous aviation experience**

Bale RM & Ambler RK (1971). Application of college and flight background questionnaires as supplementary noncognitive measures for use in the selection of student naval aviators. *Aerospace Medicine*, 1178 - 1181.

Adaptability Rating for Military Aeronautics ARMA

- Semi-structured interview, performed by a flight surgeon
- Historically used to assess the motivation and mental stability of candidates for pilot training
  - Inventory of favorable personality and personal traits
- Scoring schemes have been attempted with cut scores
  - At one point, negative traits resulted in points being deducted (nail biting will cost you from 10 to 20 points; family criminality costs the same)
- Currently either *Satisfactory* or *Unsatisfactory* (resulting in disqualification from flying training)

Assess Their Motivation to Fly

Selection: A Service? Science? Both?

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An example:

- **Neuropsychiatrically Enhanced Flight Screening (N-EFS)**

  - Combined medical <u>and</u> research program

  --Cognitively baseline incoming pilot students

  » Archive results for future comparison (Medical)

  - Validate personality testing for <u>future</u> selection and assignment (requiring participant's consent - Research)

Medical

- **Collect Baseline Data on Individual Pilots**
- **Multidimensional Aptitude Battery (MAB - An I.Q. Test)**
- **CogScreen - Aeromedical Edition**

- **Mandatory**

Research

- **Establish Pilot Norms on Non-medically Referred**
- **NEO Personality Inventory - Revised (NEO-PI-R)**
- **Armstrong Laboratory Personality Survey (ALAPS)**

- **Optional Research - Informed Consent Solicited**

Multidimensional Aptitude Battery (MAB)

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- **Verbal IQ** - Crystallized ability (results from interaction with the culture)
  - ***Information*** - Fund of knowledge, long-term memory
  - ***Comprehension*** - Ability to evaluate social behavior
  - ***Arithmetic*** - Reasoning and problem-solving ability
  - ***Similarities*** - Flexibility, adjustment to novelty, abstract thought, long-term memory
  - ***Vocabulary*** - Openness to new information, capacity to store, categorize and retrieve words and verbal concepts previously learned

Multidimensional Aptitude Battery (MAB)

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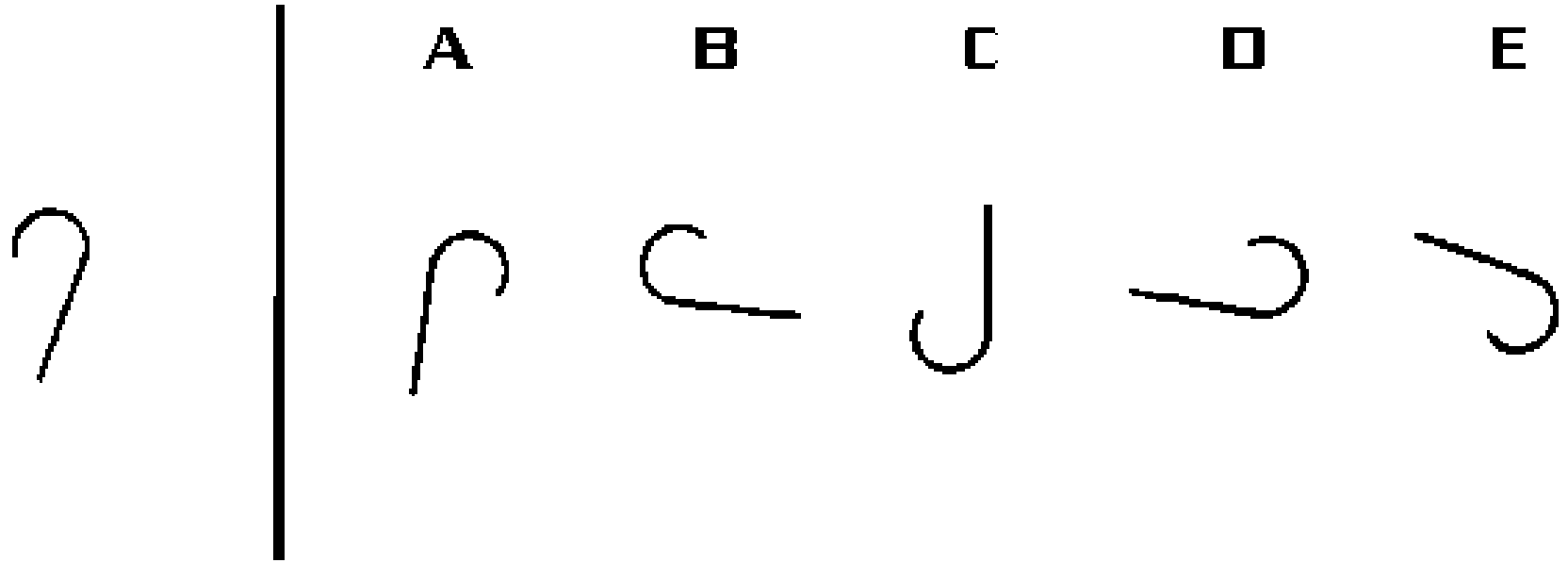
- **Performance IQ** - "Fluid" ability (independent of education an experience, capacity for learning and problem solving)
  - ***Digit Symbol*** - Adaptation to a new set of demands, learning coding, performing visual-motor tasks
  - ***Picture Completion*** - Identifying important missing elements in a picture, knowledge of common objects
  - ***Spatial*** - Ability to visualize abstract objects in different positions
  - ***Picture Arrangement*** - Ability to identify a meaningful sequence, social intelligence and insight into others' behavior
  - ***Object Assembly*** - Visualization skills and perceptual analytical skills needed to identify a meaningful object from a left-to-right sequence

MAB Performance Part III - Spatial

Sample 3 of 3



A B C D E

Previous Question

End Samples

V1.1

Multidimensional Aptitude Battery (MAB)

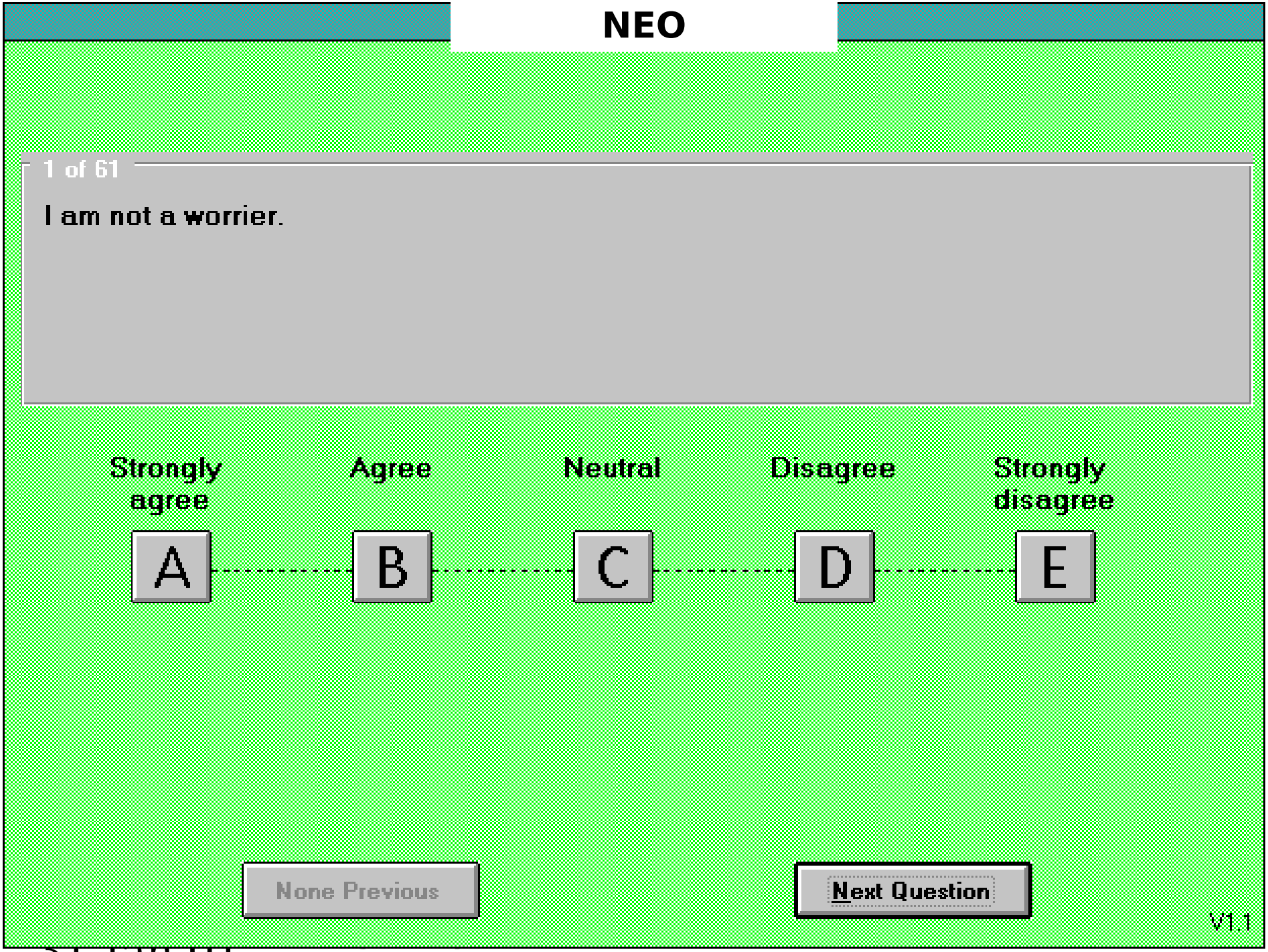
- **Full Scale IQ -** General aptitude (compilation of all subtests).
  - Note: IQ scores are standardized scores with a mean set at 100 and a standard deviation of 15.

CogScreen-Aeromedical Edition

- **Computer based (uses light pen technology)**
- **Contains measures of speed and accuracy**
  - **Thruput a measure of correct responses per a unit of time**
- **Process Measures capture error, qualitative factors**
  - **Premature Responses - Measures impulsivity, failure to inhibit responses**

NEO-Personality Inventory-Revised (NEO-PI-R)

- **Neuroticism** (*N*) **-** Level of emotional stability
- **Extraversion** (*E*)- Sociability, assertiveness, activity
- **Openness** (to experience; *O*) - Imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, independence of judgment
- **Agreeableness** (*A*) - Altruism, sympathetic to others and eagerness to help, belief that others will be sympathetic
- **Conscientiousness** (*C*) - Self-control, determination


NEO
1 of 61
I am not a worrier.
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
A
B
C
D
E
None Previous
Next Question
v1.1

Armstrong Laboratory Aviator Personality Survey (ALAPS)

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- Personality Scales

- **Confidence** (*CO*): High scorers view themselves as highly capable, intelligent, and talented. This tendency may include the negative elements of arrogance, manipulation, and condescension. Clinically, traits may suggest narcissism.
- **Socialness** (*SO*): High scorers are extremely social and outgoing. They enjoy others and are socially comfortable. They see themselves as friendly and charming. Clinically, these traits may include elements of histrionic personality disorder.
- **Aggressiveness** (*AG*): High scores are assertive to the point of being aggressive. They take strong stands and tolerate little criticism. They are verbally and emotionally combative. This quality probably does not rise to the level of antisocial personality disorder.

Armstrong Laboratory Aviator Personality Survey (ALAPS)

- Personality Scales (continued)

- **Orderliness** (*ORD*): High scorers are orderly in a behavioral and environmental way. Their lives are structured and neat. They are methodical and disciplined. Clinically, this tendency may rise to the level of compulsive personality disorder.

- **Negativity** (*NE*): High scorers are angry, negative, and cynical. They are socially punitive and not pleasant to be around. Clinically these traits may rise to the level of negativistic or passive-aggressive personality disorder.

Armstrong Laboratory Aviator Personality Survey (ALAPS)

- Psychopathology Scales

- **Affective Lability** (*AF*): High scorers are generally emotional and reactive. They are situationally anxious, depressed, and frightened. Moods are seen as changing quickly with little provocation. Affect is volatile.
- **Anxiety** (*AN*): High scorers are chronically anxious. They worry and brood. The anxiety interferes with their lives and occupational functioning.
- **Depression** (*DE*): High scorers are depressed. Problems include dysphoric affect as well as the cognitive and vegetative symptoms of depression. They report being pessimistic, unhappy, and guilty. Extreme elevation may include clinical major depression.
- **Alcohol Abuse** (*AL*): High scorers like to drink, drink a great deal, and get intoxicated. Functioning is impaired; there may be social/occupational problems.

Armstrong Laboratory Aviator Personality Survey (ALAPS)

- Crew Interaction Scales

- **Deference** (*DE*): High scorers are deferent to a fault. They are submissive and quiet. They concentrate on their job and are not likely to question the status quo.
- **Dogmatism** (*DO*): High scores believe they are always correct and are not open to change. They are interpersonally authoritarian. They are intolerant of other people, their ideas and their actions.
- **Impulsivity** (*IM*): High scorers act first and then think. They often act and talk without sufficient forethought. They see themselves as "spontaneous."
- **Organization** (*ORG*): High scorers are systematic and organized. They coordinate and plan all elements of a project. They thoroughly think things through.

Armstrong Laboratory Aviator Personality Survey (ALAPS)

- Crew Interaction Scales (continued)

- **Risk Taking** (*RI*): High scorers enjoy danger and risk. New activities and situation are not of concern. They are adventurous, unafraid, and fun loving. They are not necessarily impulsive about their activities; their action may be calculated and include a rational appreciation of the inherent danger.
- **Team Oriented** (*TE*): High scorers enjoy and believe in teamwork. They value team effort and team rewards. They do not enjoy working alone and may be inefficient when doing so.

Combining Selection and Safety

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- **Merged N-EFS and Safety Databases (AFSC-TR-2001-0001)**
  - **Compared pilots with a “human-error” mishap to pilots in a non “human error” type mishap**
  - **Remember, personality data collected BEFORE the mishap**

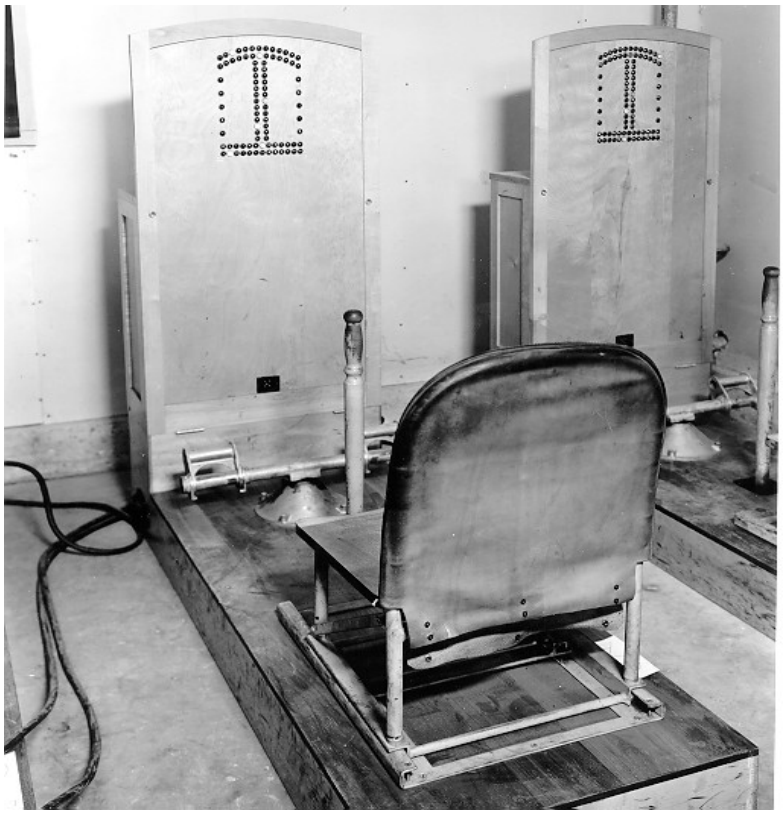
Conscientiousness

Facet Name	Odds Ratio	Confidence Band
Competence	3.75	1.64-8.55
Dutifulness	2.39	1.09-5.22
Order	1.53	0.65-3.64
Self-Discipline	1.39	0.61-3.20
Achievement Striving	1.17	0.54-2.53
Deliberation	1.05	0.41-2.68

USAF Pilot Selection Standards

- **Medical Standards:**
  - **Must pass a Flying Class I physical (AFI 48-123)**
- **Anthropometric Standards:**
  - **Height: between 64 and 77 inches**
  - **Sitting Height: between 33 and 40 inches**
- **Aptitude Test Scores:**
  - **Air Force Officer Qualifying Test (AFOQT) & Basic Attributes Test (BAT)**
  - **Applies to Active Duty, Air National Guard, OTS, and ROTC (recent addition of USAFA)**

WWII Psychomotor Test



Air Force School of Aerospace Medicine Complex Coordina

Post-WWII USAF Pilot Selection

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- **Apparatus testing discontinued in mid-1950's due to administrative problems**
- **Selection Factors:**
  - **Medical/ physical qualification**
  - **Educational achievement (e.g. college GPA & major)**
  - **Aptitude test scores (paper & pencil)**
  - **Prior flying experience**
- **Reemergence of apparatus testing in 1993 (Basic Attributes Test)**

Pilot Candidate Selection Method (PCSM - "Pick Some")

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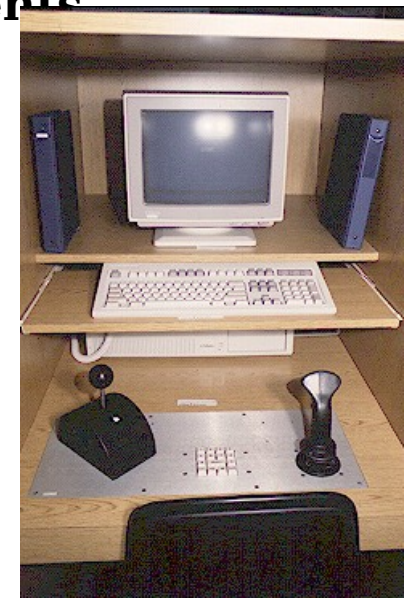
PCSM - A mathematical model designed to predict a candidate's potential to succeed at Undergraduate Flying Training (UFT)

PCSM is a way to try to screen out those who would not graduate.

- A score from 1 - 99 (with uniform distribution)
- Composed of:
  - Previous powered flying hours
  - AFOQT Pilot Score
  - Basic Abilities Test (BAT) Measurements
    - Psychomotor
    - Item Recognition
    - Time Sharing
    - Response Times
    - Activities Inventory



Pilot Candidate Selection Method

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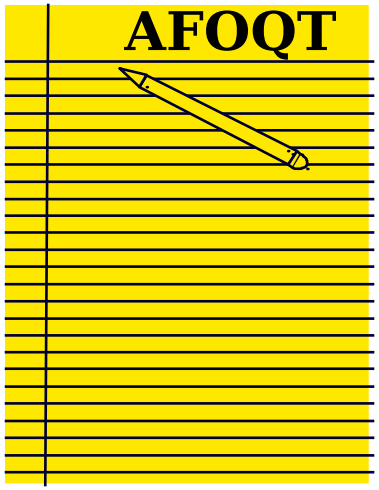
Paper-and-pencil



- ***g***
- **Verbal**
- **Math**
- **Spatial**
- **Aircrew Interest/ Knowledge**
- **Perceptual Speed**

+

Basic Attributes Test

- **Psychomotor**
- **Cognitive**
- **Attitudes**

+

Previous Flying Experience

USAF Pilot Selection

- **Major Sources of Pilots**
  - **US Air Force Academy (USAFA)**
  - **Reserve Officer Training Corps (ROTC)**
  - **Officer Training School (OTS)**
  - **Active Duty (AD)**
  - **Air National Guard (ANG)**
- **<u>Selection Methods vary by Commissioning Source</u>**

Undergraduate Pilot Training (UPT) Including Euro-NATO Joint Jet Training

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T-41A Mescalero

T-37B Tweet

T-38A Talon

Specialized Undergraduate Pilot Training (SUPT)

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T-3 Firefly

T-37B Tweet

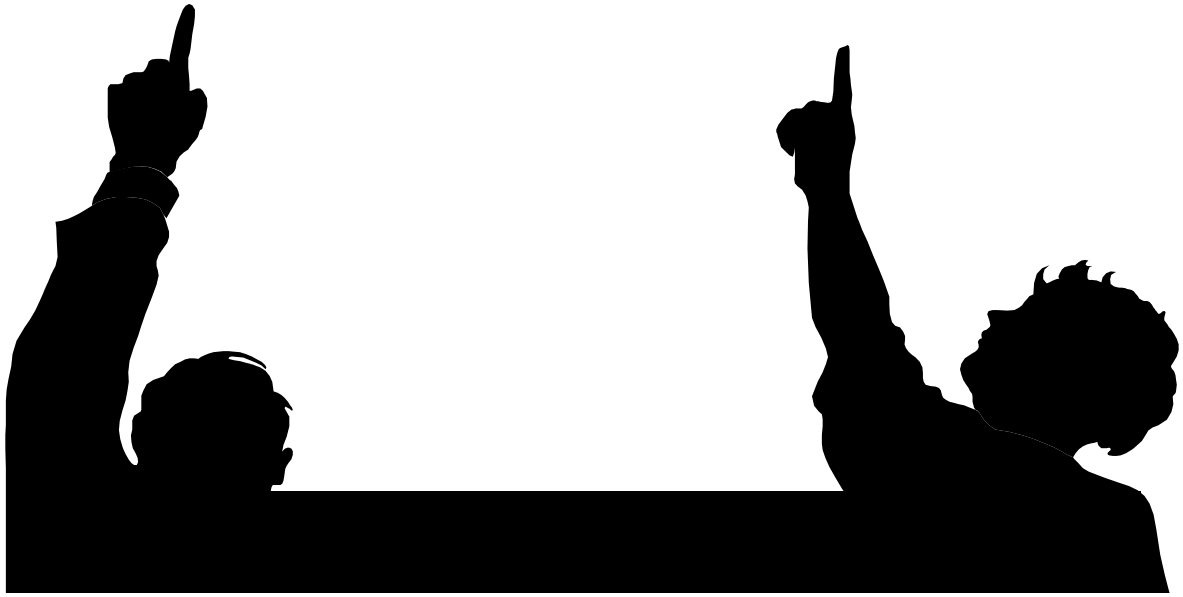
Or

T-38A Talon

T-1A Jayhawk

Training

Introductory Flight Training



Questions?